

California Biodiversity Initiative

A Roadmap for Protecting the State's Natural Heritage



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Introduction

California is a world biodiversity hotspot. Among the fifty states, California is home to more species of plants and animals and the highest number of species found nowhere else. This richness spans the entire state from the coast to the mountains, in cities and on farms, and throughout the valleys and deserts. Together, the State's plants and animals co-exist to create the complex and beautiful ecosystems upon which so much of the State's people and economy depend. Even after decades of economic and population growth, California has managed to maintain much of this biodiversity.

However, a concerted, synergized set of actions led by the State of California, in partnership with others, is necessary to maintain California's biodiversity into the future. Global warming is changing ecosystems at an unprecedented pace, posing direct threats to the State's plants, animals, and the habitats in which they live.

California is the most populous state in the nation. Our population is projected to reach 50 million by the middle of this century, which will require investments in transportation, infrastructure, housing, and other things. All of these decisions are being made in the context of the ambitious goals to address climate change, water management, air quality, and a range of other important environmental and public health challenges. This Initiative and Roadmap provide a starting point to recognize and integrate biodiversity protection into the State's environmental and economic goals and efforts.

The Goal of this Biodiversity Initiative and Roadmap

The goal of this Biodiversity Initiative and Roadmap is to secure the future of California's biodiversity. This goal is not a value judgment picking winners or losers between the environment and the economy. Securing biodiversity benefits the State's short- and long-term environmental and economic health. The exceptional story of California is well known. California is home to a culture of innovation and creativity. We are a global leader in so many areas, including planning for climate change. We can also be world leaders for biodiversity conservation.

California's lands span more than 158,000 square miles with over 4,900 lakes and reservoirs, 175 major rivers and streams, and 1,100 miles of coastline. The deserts, mountain ranges, vast valleys, wetlands, woodlands, rivers, estuaries, marine environments, and rangelands and agricultural fields of California provide habitats for approximately 650 bird species, 220 mammals, 100 reptiles, 75 amphibians, 70 freshwater fish, 100 marine fish and mammals, and 6,500 taxa of native plants.

Protection and recovery of the State's biodiversity requires the following. First, we must identify what needs to be protected and establish goals. Second, strategies must be put in place to protect, manage and restore ecosystems to achieve these goals. Then, we must monitor progress toward achieving goals then adapt and adjust as we learn.

This Initiative and Roadmap embrace these broad goals:

- Secure the future of all existing native California species, with an emphasis on those that are not found anywhere else.
- Secure all California ecosystem types, establishing goals that are consistent with global commitments under The Convention on Biological Diversity. A starting point is to:
 - Protect 20 percent of each terrestrial, freshwater, coastal, and marine ecosystem type; and,
 - Recover and restore 15 percent of each ecosystem type from its degraded or disturbed status.
- Preserve ecosystems at the regional scale, with sufficient linkages, buffers and refugia to provide a robust future for all native species in the face of climate change.
- Increase ecosystem and native species distributions in California, while sustaining and enhancing species abundance and richness.
- Improve the ecological conditions, ecosystem functions, and natural processes vital for sustaining these ecosystems across California. These include things like connectivity of habitats, community structure and composition, water quality, and soil and sediment quality, as well as successional dynamics, disturbance regimes, hydrological regimes, and sediment and soil processes.

Finally, efforts ***must increase in size and accelerate in pace*** to achieve these goals in collaboration across all sectors and communities.

[A Biodiversity Goal Complements Other Efforts](#)

This Initiative and Roadmap build on a number of ongoing State activities. Between 2010 and 2018, the Brown Administration has created a comprehensive approach to some of the State's most pressing economic and environmental challenges. Implementation of this biodiversity focus should occur alongside and in coordination with these ongoing efforts. These include the following:

- **The 2015 State Wildlife Action Plan**

The 2015 State Wildlife Action Plan details regional conservation strategies for terrestrial, freshwater aquatic, and marine resources across all geographic provinces in California. For each ecosystem, this plan specifies a timeline, measurable objectives, conservation targets, goals, and key ecological attributes in an easy to digest tabular format. The Department of Fish and Wildlife will provide this information to all State agencies and other partners. The department has also developed an ecosystem services policy.

- **Safeguarding California**

Safeguarding California is the State's climate adaptation strategy and is prepared every three years by the California Natural Resources Agency. The State's most recent "Safeguarding" plan defines climate adaptation objectives for 10 sectors, with a focus on state-level actions. The Natural Resources Agency tracks implementation of the plan and

provides annual progress reports. Safeguarding California was most recently updated in 2017.

- **Forest Carbon Plan**

The Forest Carbon Plan establishes goals for healthy forests in California, including for resilient carbon storage, under changing climate scenarios. It is a combined effort across many agencies led by the California Natural Resources Agency, CalFire, and CalEPA.

- **Scoping Plan – Natural and Working Lands Implementation Plan**

The California Air Resources Control Board is an international leader describing the approach California will take to reduce greenhouse gas emissions. Their 2017 Scoping Plan called for the development of a Natural and Working Lands Implementation Plan that will establish a goal for carbon sequestration in the State's natural and working lands and outline pathways to achieve that goal.

- **Climate Change Indicators for California**

The California Environmental Protection Agency's Office of Environmental Health Hazard Assessment regularly reports on a set of indicators developed to understand the drivers of climate change and observed effects on physical and biological systems. The report includes thirty-six indicators that track the health of ecosystem and species' patterns and status.

- **Integrated Conservation and Development Program**

The Strategic Growth Council has developed the Integrated Regional Conservation and Development Program (IRCAD). IRCAD brings together conservation and development planning at an ecoregional scale to support more effective approaches to mitigation. IRCAD has started with pilot projects in two ecoregions of California, the Mojave Desert and the Modoc Plateau.

- **General Plan Guidelines**

The Office of Planning and Research adopts and updates General Plan Guidelines (GPG) to provide guidance to cities and counties for the development of their general plans. Updated in 2017 for the first time in over a decade, the GPG integrates climate change and sustainability considerations throughout the document.

- **California Healthy Soils Action Plan**

The California Department of Food and Agriculture created a California Healthy Soils Action Plan. This plan is an interagency effort to promote the development of healthy soils on California's farm and ranchlands through innovative farm and ranch management practices that contribute to building adequate soil organic matter, which increases carbon sequestration and reduce overall greenhouse gas emissions.

- **California Agricultural Vision (Ag Vision)**

In 2008, the Department of Food and Agriculture and the State Board of Food and Agriculture launched Ag Vision, which is an effort to plan for the future of agriculture and the food system in California in collaboration with numerous key partners. The purpose of Ag Vision is to develop and monitor progress of strategies for the sustainability of California agriculture, such as water, regulations, labor, invasive species, urbanization and others.

What is Biodiversity?

Broadly, biodiversity refers to the variety of life at all scales, ranging from genes to species to whole ecosystems. At a regional or state scale, biodiversity is the diversity of species, habitats and vegetation types. At the species scale, biodiversity is the genetic variation within a population or among populations. Conservation biologists started using the term over the last 40 years, as they increasingly focused on the interconnections essential to ecosystem health. As biologist E.O. Wilson noted, biodiversity is a shift from a “bits and pieces” approach to a more holistic conceptualization of and approach to conservation.

The variety of life – biodiversity – in California can be explained by our unique geography, climate, geologic history, and sheer size. The species in this state have incredibly high richness (diversity), rarity (sensitivity) and endemism (found nowhere else). Add these factors together and you get one of the planet’s richest and most diverse places for life.

As we plan for the long-term resilience of the State’s native species, we must consider the ecosystems in which they thrive. The new reality of climate change requires a systemic approach that considers the connections and linked relationships across all elements, abiotic and biotic, of our State. These include the work of pollinators, nitrogen fixing bacteria, soil mycorrhizae, animals to spread seeds, and other intricate connections throughout food webs. Soil carbon is another example. These connections between many different species are central to the success of biodiversity conservation. Healthy ecosystem processes sustain plant and animal biodiversity. Ecosystems are more stable and more resilient under changing climate when they have higher diversity of species. ***This system-wide perspective is essential for the survival of California’s species and biodiversity wealth.***

California’s designation as a global biodiversity hotspot is based on the high diversity of native plant species. If we lose California’s native plants, the state’s ecosystems and biodiversity will suffer. Plants have generally received less attention than animals for conservation and protections. Therefore, while this Action Plan is about much more than plants, it draws attention to and directs state investment for native plants like no previous plan.

Governor Brown Launches a California Biodiversity Initiative in 2018

On May 22, 2018, Governor Brown issued a proclamation declaring that day International Day for Biological Diversity and followed this proclamation with the announcement of the California Biodiversity Initiative in the May Revision to the 2018-19 budget. The final 2018-19 Budget allocates \$2.5 million to launch the California Biodiversity Initiative in partnership with Tribes,

educators and researchers, the private sector, philanthropy, and landowners. The California Biodiversity Initiative will improve understanding of the State's biological richness and identify actions to preserve, manage, and restore ecosystems to protect the State's biodiversity from climate change.

The Initiative will begin the following efforts. These immediate steps by the Brown Administration provide a foundation for future action and fall into three broad categories: Understand, Protect, and Manage.

Understand:

- The California Department of Fish and Wildlife will **update the official "Atlas of the Biodiversity of California,"** which was published in 2003. The department will work with the Department of Conservation, the Strategic Growth Council, and others to complete the update, including developing an online portal for public accessibility.
- The Department of Fish and Wildlife will take the next step with a network of partners **to survey and map all plants and vegetation in California,** with a project to finish vegetation mapping for the southern Sierra foothills.
- The Department of Food and Agriculture **will establish a Soil Carbon Map of California,** to serve as an indicator of soil health, which is key to ecosystem health and maintenance of biodiversity.

Protect:

- The California Ocean Protection Council will lead an effort in collaboration with others to **add California's Marine Protected Area Network to the International Union for the Conservation of Nature Green List of Protected Areas,** the global standard for conservation in protected areas.
- The Department of Conservation, Wildlife Conservation Board, and Strategic Growth Council in collaboration with others will convene a working group **to develop standard language for conservation easements** to provide for protection of biodiversity.
- The California Department of Transportation and Department of Fish and Wildlife will **update a 2010 statewide assessment of essential habitat connectivity** so that transportation and infrastructure modernization can help achieve biodiversity goals. This tool has improved road and highway design since 2010, but the science, data and modeling techniques have progressed and an updated connectivity analysis is necessary to integrate biodiversity conservation with transportation and infrastructure planning. Vehicle collisions produce significant wildlife mortality in the state.

Manage:

- The California Department of Food and Agriculture **will identify financial and regulatory support needed for agricultural and working lands to remain viable and productive** in the long term, and support resilient food production under changing climate conditions.

- The Department of Food and Agriculture ***will join forces with the Department of Fish and Wildlife and others to tackle head on the challenges posed by weeds and invasive species***, with an immediate focus on nutria.
- The California Department of Food and Agriculture will recognize the California Plant Rescue as a coordinated joint venture and as the State's partnership to ***save our gene resources through the long-term sustainability of the California Seed and Germplasm Bank***.
- The Department of Fish and Wildlife will take steps to bring the California Landscape Conservation Cooperative and California Conservation Partnership into the department ***with the dedication of a collaborative coordinator to assist with biodiversity actions***.

The California Biodiversity Initiative Responds to Real Threats and Challenges

California is a diverse and varied state with a history and future inexorably tied to its natural and working landscapes of mountains, deserts, valleys, coastline, and ocean. Our stature as world leaders in sustainable technology, science, agriculture, and climate change mitigation is due in no small part to our appreciation of these natural treasures. Biodiversity is an important marker of the health and resilience of our ecosystems. California's continued success in protecting biodiversity will require even more focus as the climate changes, the population continues to grow, and associated factors stress the State's natural systems.

Changing Climate Conditions and Extreme Events

California's climate is changing. Rising temperatures, increases in the frequency and severity of extreme events, including drought and wildfire, changing ocean conditions, and shifts in precipitation patterns all pose threats to California's plants and animals. Catastrophic events from fire and drought have profound effects for biodiversity. Scientists have already documented changes in forest composition as more trees die due to drought, fewer large trees exist in California forests, and the tree line begins at higher elevations. A 2017 study from the University of California, Davis concludes that half of California's natural vegetation – or an area ***as large as 75,000 square miles*** (approximately equal to the size of the San Francisco Bay Delta Watershed or about one-third the size of California) – is at risk if the Paris Climate Accord's targets are not met.

Increasing average temperatures and changes in extreme temperatures alter the temperature ranges in which species thrive and survive, causing stress to plants and animals. These temperature changes create a series of cascading effects, altering predator-prey relationships, causing fluctuations in food and water supplies, and exacerbating human-caused stressors like contaminants and habitat loss. Scientists have already observed range shifts in almost three-quarters of small mammals in California and over eighty percent of bird species surveyed.

California's coastal areas evolved in a dynamic zone between land and sea, including wetlands, bluffs, and intertidal habitat. An estimated 550 square miles, or 350,000 acres, of wetlands exist along the California coast. Sea level rise will inundate many of these resources and development and land use decisions can compound this problem, preventing inland migration.

Changes in ocean chemistry and circulation, and ocean warming will impact pelagic species distribution and community structure. Ocean acidification is already affecting shellfish species.

Loss of Species, Habitat Types and Ecosystem Services

California's wetlands and riparian woodlands and forests have suffered extensive losses. An estimated 80–90 percent of these productive and biologically diverse landscapes have been altered or lost in the past 150 years. As an example, the majestic and plentiful oak woodlands of California have shrunk dramatically. Similarly, less than 10 percent of the Central Valley's grasslands remain today. Some of California's once robust native fish populations are at or near historic lows. Declining species and lost habitat disrupt the cultural, spiritual, and ecological practices of California's Native American tribes. The seasonal timing of biological events is changing too, from bird migration to mismatched flowering times with pollinator insect emergence. California biodiversity supports ecosystem services that are good for people and the economy like carbon sequestration, timber production, crop pollination, soil fertility, tourism, and recreation, all of which decrease in value if we lose biodiversity.

Land Conversion and Habitat Fragmentation

Land use has been changing as the State's population continues to grow. Development decisions sometimes result in the conversion of natural and working lands to urban uses, destroying natural habitats and corridors necessary for migration of species, which are even more important under changing climate conditions. The future of biodiversity protection requires partnerships with California's agricultural and ranching communities to minimize land conversion. Working landscapes are biodiverse landscapes, providing a safe haven for native plants and animals, habitat for pollinators, and important connections for migration.

Invasive Species and Pests

Diseases and pests have tremendous impacts on native biodiversity, nearly eliminating susceptible species and transforming ecosystems and environmental services. Invasive plants out-compete California native plants, and invading species can affect native biodiversity by parasitism or predation. This problem is extensive across California counties. For example, quagga and zebra mussels infest reservoirs and canals, threatening billions of dollars of damage to water infrastructure. Nutria, invasive rodents of unusual size, reproduce rapidly, consume wetland vegetation at an astounding rate, and burrow into levees, causing damage to infrastructure. The old adage is true – an ounce of prevention is worth a pound of cure. Early detection and prevention can avoid more expensive long-term treatment and management.

Institutional Barriers

Responsibility for the protection, restoration and management of the State's natural biodiversity is carried out through the activities of our State agencies. In addition to having different missions, these agencies also have different authorities, and, in some cases, geographic or topical scopes. While this structure allows for focused efforts and initiatives, the segmenting can make it more challenging to work toward cross-cutting goals, such as those for biodiversity. Biodiversity requires thinking about the interconnected systems in the natural

world. For government to achieve biodiversity conservation, it will have to make a focused commitment to facilitate coordination across all the various State agencies and efforts.

A Roadmap for Future Biodiversity Actions

The State will undertake the immediate tasks identified above as part of the Initiative launch. More work remains to be done. As the Brown Administration comes to a close, the set of actions outlined in the remainder of this document provide a roadmap of long-term steps for achieving our biodiversity goals.

Some of these actions are new proposals. Some are currently being planned and should be completed more rapidly, implemented in a better way, or on a larger scale. Success will require the cooperation of many partners. The State's role is to lead, help others, marshal resources and partnerships, and remove barriers to action.

The Roadmap portion of the California Biodiversity Initiative is focused on seven broad areas.

AREA 1: Help Government Coordinate on Biodiversity Goals

Institutions across state and local government operate programs that contribute to achieving biodiversity goals established in this Initiative. Achieving these goals requires engaging the whole "system" of government in a common mission and leveraging our resources and actions to achieve a common vision. Through this coordination, the solutions and actions can become part of our collective system. They are designed to support coordination across state efforts and establish common frameworks, approaches and priorities. Actions in this area should include the following.

Establish the California Biodiversity Initiative Working Group

An immediate next step is to create a cross-agency working group co-chaired by the director of the Department of Fish and Wildlife and the secretary of the Department of Food and Agriculture to facilitate coordinated actions to achieve the State's biodiversity goals. Government must work across its institutions such as: the California Landscape Conservation Cooperative; California Biodiversity Council; Strategic Growth Council; Department of Conservation; Governor's Office of Planning and Research; Ocean Protection Council; Department of Parks and Recreation; Fish and Game Commission; Natural Resources Agency; and, California Environmental Protection Agency.

Institutionalize and Maintain Support for the California Landscape Conservation Cooperative

In 2010, the United States Department of the Interior created landscape conservation cooperatives for the application of systematic conservation planning using a largescale regional framing that accounts for future climate change. Biodiversity protection in California is so large it will not succeed without coordinated planning and government support. The Department of Fish and Wildlife collaborated with others on a memorandum of understanding creating the California Conservation Partnership for landscape

conservation of natural resources in the State. Work should continue to implement this memorandum and ensure continuity of the California Landscape Conservation Cooperative.

Prioritize Actions Around Biodiversity and Align Landscape-scale Planning with Biodiversity Goals

Examples of possible actions to prioritize and align planning efforts include:

- The protection of wetlands and coastal marshes as important carbon storage resources.
- Mapping and modeling of Important Plant Areas in California to facilitate protection and restoration of these locations.
- Biodiversity-friendly management actions on working lands, including restoration of fire regimes in managed forests and conservation grazing on rangelands.
- Opportunities for restoration of degraded or disturbed habitat with high potential to enhance biodiversity and carbon sequestration.

Regional Conservation Assessments, Regional Conservation Investment Strategies, and other planning efforts like the Natural Community Conservation Plans should include biodiversity goals as well.

Update Relevant Strategic Plans to Include Biodiversity Goals

This effort to update relevant plans should include the California Wildlife Conservation Board's Strategic Plan and other plans governing investments and policies that affect the State's biodiversity goals

AREA 2: Improve Our Understanding of California's Biodiversity

To solve a problem, you must first understand the problem. Information is the key to understanding. California lacks a comprehensive and systematic approach to biodiversity assessment. The State's public trust natural resources agency – the California Department of Fish and Wildlife – lost significant funding support for statewide assessments of plants and animals decades ago. The State's world-renowned universities and research centers conduct critical scientific work, but there is a need for standardization and strategic integration across the public-private divide for core resource assessments to track the trends and status of the wealth of biodiversity in California.

In order to meet goals to preserve and protect California's biodiversity, it is necessary to develop a baseline understanding of the current status of the State's biodiversity. Doing so requires documenting where species are located, current status, and potential threats. This baseline knowledge is the foundation of intelligent action. With a full understanding, we can scientifically assess rarity, prioritize resources and efforts, and make sound conservation and development plans that are based on data. Actions in this area should include the following.

Make Data and Tools Transparent and Readily Available

State agencies should work together to publish an annual roster of State clearinghouses for monitoring data across landscapes, species, and coastal and marine environments. State agencies could also develop a network of monitoring sites across public lands to assist in tracking biodiversity and other management actions. As technology rapidly advances, the State and private partners can explore newly developed scientific approaches to biodiversity and plant assessments such as phylogenetic prioritization, GIS software, and modeling. The use of information has a nexus with building general public awareness and support for biodiversity preservation. For example, the California Biodiversity Initiative could identify specific tools to expand the resource and assessment community for Californians, including advancing community scientist efforts like rare plant treasure hunts, Bio Blitzes, CalFlora, and iNaturalist.

Develop Priorities for Monitoring

For decades, California has maintained Natural Heritage Ranks that are used by scientists, planners and developers. Future steps under the Initiative could include bringing these ranks up to date, ensuring people can make use of increasing amounts of new data, and integrating various data sets to identify Important Plant Areas.

AREA 3: Improve Understanding and Protection of the State's Native Plants

Plants are one of the foundations of ecosystems. In California, native plants help establish the State's status as a global biodiversity hotspot. We are home to more than 6,500 native plant taxa, of which more than 2,000 only occur in California and nowhere else in the world. The State is home to 32 percent of all native plant taxa that occur in the United States. Knowledge and policy around the State's plant resources have generally lagged behind similar efforts for animal species. This set of actions is intended to bring greater parity in policy considerations between the State's plant and animal species. Actions in this area should include the following.

Completing the Survey of California Vegetation

The Department of Fish and Wildlife can lead a network of partners to survey and map plants and vegetation in California, to complete the Survey of California Project. Albert Wieslander led the first statewide systematic survey of California's vegetation from 1928 to 1939. That mapping project remains the most complete survey of plants and vegetation in California, but it is outdated. Since 2003, the department and others have mapped half the State with a modern, standardized and repeatable system. Half remains to be surveyed and mapped. Such an assessment will analyze distributional records from herbaria and field investigations and provide a basis for planning and funding to acquire, manage and maintain the many unique botanical values of the State not yet protected. Simultaneously, voucher specimens of rare plants could be collected during mapping to be deposited at the Department of Food and Agriculture herbarium.

Lead by Example

The Department of General Services, in coordination with the Department of Food and Agriculture, can develop guidelines for native plant use in all State landscaping projects. Public outreach and education about landscaping choices is also an important task.

AREA 4: Manage Lands and Waters to Achieve Biodiversity Goals

Through its acquisition, management and conservation activities, the State has tremendous opportunity to integrate the protection and preservation of California native plants, biodiversity and ecosystems into its actions. The State's investments and plans should place highest priority on protection of the most intact and biodiverse lands. Opportunities for restoration of degraded or disturbed habitat, lands critical or at risk under future climate conditions, or for enhancing carbon sequestration, should also be identified. The State's funding and granting decisions can be leveraged to accelerate integration of this action. Broad benefits may be realized by identifying and supporting biodiversity-friendly management actions on working lands, including restoration of fire regimes in managed forests and conservation grazing on rangelands. Actions in this area should include the following.

Maintaining and Enhancing the Long-Term Benefits of Working Landscapes

The California Department of Food and Agriculture can identify financial and regulatory support needed for ranches and other working landscapes to remain viable and productive across generations. This should include supporting practices that maximize benefits to biodiversity and reducing the conversion of working landscapes to intensive agriculture and other uses and support resilient food production under changing climate conditions.

Assess and Secure the Success of Conservation Easements

Another important action is to complete an evaluation of landowner initiatives housed within State agencies to ensure alignment of native plant and biodiversity goals with those initiatives. Such an evaluation should consider new alignment opportunities such as on-farm and rangeland leaders receiving conservation easement grants through the Department of Conservation, the Wildlife Conservation Board and the Strategic Growth Council.

AREA 5: Restore and Protect Lands and Waters to Achieve Biodiversity Goals

Actions are needed to restore degraded lands and waters to provide habitat and migration corridors for species. This work must account for necessary migration corridors and refugia under changing climate conditions. Restoration activities need to consider future conditions and be designed and implemented to be resilient into the future. Restoration and protection activities need to be based on solid information gathered from communities, indigenous partners, and the latest science.

Accelerate the Pace of Restoration

The State should engage the scientific community to develop state of the art, credible and effective guidelines for restoration, evaluate standard practices, and recommend actions based upon specific practices that are successful with targeted vegetation and species'

restoration goals. A leader of this effort could be the Natural Resources Agency, who has taken progressive steps through its CalEcoRestore program to accelerate restoration permitting and do more habitat restoration faster in the Bay-Delta than in prior decades.

Work with Tribes to Use Traditional Ecological Knowledge to Support Management and Restoration Activities

The State should also establish a collaborative to support integration of tribal partners in restoration and management activities. Leaders of this effort could include the Native American Heritage Council, the Fish and Game Commission, and the Natural Resources Agency.

Accelerate and Streamline Prevention, Detection and Management of Invasive Species and Pests

California has an interest in minimizing the threats posed by invasive species and pests. The next phases of a Biodiversity Initiative must expand programs to prevent, detect and manage invasive species and pests; develop California-specific invasive species risks assessments; support and expand early detection programs, and evaluate and improve weed management efforts.

Evaluate State Protected Areas with Priorities

A 2015 study published in the Proceedings of the National Academy of Sciences concluded that the protected lands in the United States mismatch biodiversity priorities. This analysis mapped the overlay between species richness, rareness, and conservation priorities against protected landscapes. The Biodiversity Initiative should consider a similar study for California as a means to understand and inform actors, funding, collaborative partnerships, and other actions described. This action will utilize existing information that may already indicate whether protected areas align with biodiversity priorities.

Evaluate and Improve Mitigation Actions to Better Achieve Conservation Outcomes

The restoration and protection of lands to achieve biodiversity goals should consider actions already taken in the State. Therefore, a next step action is to develop a comprehensive GIS database of lands that have been protected by mitigation, restored as part of project mitigation, or otherwise subject to investments.

Evaluate and Capitalize on Opportunities to Utilized Fallowed Agricultural Lands for Pollinator Habitat

A part of the future for agriculture and conservation in California can be upscaling the use of lands for pollinator habitat. Any evaluation of agricultural lands likely to be fallowed should carefully analyze such lands that provide pollinator habitat, especially for bees. The vision of this work is to create a “pollinator highway” across California for ecosystem services.

Expand Seed Banking and Collection to Create a Hedge Against Extinction

Expanding seed and germplasm banking is a hedge against permanent loss of native plant biodiversity. California Plant Rescue is a collaborative project involving the Department of Fish and Wildlife, the California Department of Food and Agriculture, the California Native Plant Society, Consortium of California Herbaria, the National Center for Genetic Resources Preservation, and a number of California's arboreta, botanic gardens, universities, and other non-governmental organizations. This network preserves the future of California's native flora by collecting seeds of California species for long-term preservation in secure regional seed banks. In just two years, this program has collected and stored the seeds of over 300 seed accessions of 95 rare plant taxa. A Biodiversity Initiative should advance a statewide seed banking effort to conserve the native plant biodiversity of California and to develop an official California Seed Bank, as a distributed network of currently existing seed banks. This effort could include generating philanthropic support.

AREA 6: Educate Californians About Biodiversity

Big change requires more than business as usual. Given the challenges facing California's biodiversity, big change is needed. More Californians need to know about biodiversity. Government can help find and teach the next generation of leaders.

Initiate Participatory, Education-Based Actions on the Ground

The list of these actions could be long. Examples include engaging cities across the state in developing "wildlife garden" efforts with citizens and building a robust network of citizen scientists and conservation professionals to support biodiversity mapping, monitoring and adaptive management. As part of this network, the State can identify a registry of California Conservation Corps programs and partners at the California State University, University of California and other institutions to match students with monitoring and restoration efforts in priority locations. Finally, other ambitious steps could be to institute a statewide environmental awareness requirement at all state-funded universities and colleges, to institute a training program through California colleges and universities that increases the number of undergraduate students currently under-represented in the conservation workforce, and to include concepts of biodiversity in scientific educational standards.

Help People Get Outside to Bring Back Biodiversity

Each year the State can remind Californians to observe California Biodiversity Day. This biodiversity day should grow to include initiatives that encourage all Californians to get outside and help restore the State's biodiversity through projects like planting the native plant milkweed necessary to support healthy monarch butterfly populations. This could include free access to State parks, free fishing days, and annual days of service.

AREA 7: Prioritize Collaboration and Partnerships

The potential work under this area is vast. However, the value of collaboration and partnership is very simple to understand. Protecting California's native biodiversity requires cooperation and coordination across public and private landowners, the private sector and citizens.

Ultimately, success depends on including all Californians in the shared effort. Bringing more people into the fold means a greater diversity of ideas and approaches. A greater diversity of ideas and approaches in turn means more Californians will share the economic, environmental, health and personal benefits that California's biodiversity provides.

Conclusion

This California Biodiversity Initiative – the immediate series of steps we have identified – and the Roadmap represent a first step. Its success will depend on ongoing leadership by the State and collaboration with diverse partners and stakeholders, and support and engagement by all Californians.

In December 2017, a group of 26 scientific experts from across the State's universities, herbaria and conservation organizations drafted and signed an historic "***Charter to Secure the Future of California's Native Biodiversity***." Their short statement describes California's unique role as a biodiversity hotspot, the importance of preserving this status, the challenges to doing so, and identifies key action areas to achieve maintain, restore and preserve the State's biodiversity. This charter document is the inspiration for the principles and actions outlined in this California Biodiversity Initiative and Roadmap. The charter is included as an appendix. We encourage you to read it.

Appendix: A Charter to Secure the Future of California's Native Biodiversity

Declaration for Our Future

California is a wondrously diverse and varied state, a global *biodiversity hotspot*. This abundant biological diversity, the measure of a region's genetic, species, and ecosystem diversity, supports our well-being. California's native plants, in particular, enrich our lives and sustain our environment by supporting wildlife, clean air and water, soil retention, and carbon storage, providing a helpful indicator of the health of the State's biodiversity.

California is the nation's can-do state. It is technologically feasible and morally imperative to protect, restore, and conserve California's native plants and animals, and the ecosystems that they support and thrive in for current and future generations. This charter enshrines our commitment to a future that advances long-term economic and environmental gains in harmony with a growing population and the need for resilience in the face of a changing climate.

California: Home of Innovation, Sanctuary for Biodiversity

California is home to more species of plants and animals than any other state, and is home to about one third of all species found in the United States, including more rare plants than most states have plants. Despite a century and a half of rapid economic and population growth, California has managed to keep nearly all of them. This is because Californians love their common home – ranchers are proud of the sustainable grazing practices, foresters proud of their healthy forests, city dwellers proud of their Griffith, Baldwin, Ballona, Balboa, Presidio, and Bidwell parks. Collectively, we have shown the world that a thriving society can co-exist with great natural richness.

However, we are facing serious challenges and an urgent need for action. Climate change already stresses the State's natural resources. Increasingly frequent, larger, and hotter wildfires are burning our forests and communities, adding carbon to the atmosphere and damaging soil. Drought-stressed trees, in our mountains and in our cities, are succumbing to new diseases and insect pests, eliminating their cooling shade and releasing yet more carbon. Without our action, productive marshes will be flooded by rising seas, historic working landscapes will be lost, and weeds will impair the health of our headwater forests. We must work together swiftly to slow these threats and to save the native plants and animals that undergird California's economic and cultural prosperity.

California is uniquely positioned to respond to these challenges. We have the strongest conservation framework in the nation, supported by public and private partners that are committed to thoughtful, science-based stewardship of the State's natural resources. The State's climate strategy reduces greenhouse-gas emissions and builds resilience for California's people, natural resources, and infrastructure. The State's vision for 2050 commits to recognizing and protecting the values provided by healthy ecosystems and the native plants and animals on which they depend. We have recovered species, from the California condor to a rare mountain mint, from the brink of extinction; restored whole ecosystems after years of damage; and created novel

partnerships to protect plants, animals, and places. Undertaking the challenge of securing our biodiversity and seeing it thrive in the face of change will require the concerted work of many across government, academia, and the private sector, but we build on a strong foundation. This charter establishes common principles and a pathway to bring these groups together to succeed.

Principles for Action

Scientific Foundation – The future we envision requires science-based management and conservation decisions consistent with economic and environmental sustainability for all Californians. Science should be embraced not ignored as a means to help navigate change and uncertainty. This scientific basis must inform decisions at every level from local to state, regional to global.

Collaboration and Partnership – Responsibility and opportunity to protect California’s biological diversity cuts across local, state and federal agencies, as well as private landowners and managers. The knowledge and research to guide action lies in academic, government, non-profit and research institutions. This effort must be built on a model of partnership and collaboration.

Inclusion - Our cultural diversity, backgrounds, and traditional connections with nature are essential ingredients to form solutions. All Californians benefit from biological diversity, be it a shade tree in an El Segundo playground, resources brought by Sequoia-seeking visitors, the trout stream cooled by wild willows, or the tribe renewing their traditional arts. Threats to native plants and animals affect all, whether urban or rural, wealthy or poor, recent immigrant or indigenous, and all Californians have a right to participate in saving these species, in ways that are meaningful to them. This effort must be built on inclusion of California’s diverse public, communities and perspectives.

Pathways to Success

This charter calls upon all Californians to work together to secure and recover the abundance and richness of native plants and animals in California, under both current and changing climate conditions. To achieve this goal, we must:

Understand the rich natural diversity we have in California, including where it is; what is at risk; what threats the native species and ecosystems of our state face; and what approaches to conservation, restoration, and recovery will be most effective under current and future conditions.

Protect California’s native species and ecosystems, securing all of them from decline and extinction, including efforts to continue to exclude invasive plants and pests, especially in light of climate change.

Recover imperiled and damaged species and systems, and their ability to provide natural, cultural, and other values throughout their original extents.

Engage and empower all Californians in the project of sustaining our common home, with public education, outreach and involvement in citizen science and stewardship. We must harness the genius of our research institutions and technological leadership; build partnerships that embrace tribes, local and traditional knowledge, and our diverse next generation; pursue site-specific conservation actions to save the most sensitive species; forge public-private partnerships; support

working landscapes; and engage all of our citizens.

Undertaking this challenge will require participation by many across government, academia, and the private sector, but California is home to a culture of innovation and creativity, with a tradition of doing and accomplishing great things. Together, we can enable California to continue to be a global leader in the stewardship of natural resources, and put into action a framework to steward our native plants and animals for future generations.

Founding Signatories

David Ackerly, University of California Berkeley
Tony Barnosky, Stanford University, Jasper Ridge Preserve
David Bunn, California Department of Conservation
Mary Burke, University of California Davis Arboretum and Public Garden
Dick Cameron, The Nature Conservancy
Nona Chiariello, Stanford University, Jasper Ridge Preserve
John Clark, Center for Plant Conservation and San Diego Zoo Global
Frank Davis, University of California Santa Barbara
Peggy Fiedler, Natural Reserve System, University of California
Naomi Fraga, Rancho Santa Ana Botanic Garden
Dan Gluesenkamp, California Native Plant Society
Brett Hall, University of California Santa Cruz, Arboretum and Botanic Garden
Susan Harrison, University of California Davis
Todd Keeler-Wolf, California Department of Fish and Wildlife
Dean Kelch, California Department of Food and Agriculture
Denise Knapp, Santa Barbara Botanic Garden
Staci Markos, University of California Berkeley, Jepson Herbarium
Susan Mazer, University of California Santa Barbara
Lucinda McDade, Rancho Santa Ana Botanic Garden
Connie Millar, US Forest Service
Brent Mishler, University of California Berkeley, Jepson Herbarium,
Jason Sexton, University of California Merced
Shannon Still, University of California Davis Arboretum
Jim Thorne, Information Center for the Environment (ICE), UC Davis
Genevieve Walden, California Department of Food and Agriculture
Misa Werner, California Energy Commission
Erika Zavaleta, University of California Santa Cruz